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(54) Conveyor belts

(57) A conveyor belt suitable for use
in the food industry and which is
dimensionally stable in use, comprises
a matrix (1) of woven stainless steel
wires (3, 4) which is either embedded

in a plastics material or coated with
such material to fill the mesh (1) and
provide smooth impervious surfaces
on both sides. The free ends of the
weft wires (3) are turned back over
the warp wires (4) to provide a
selvedge (2).

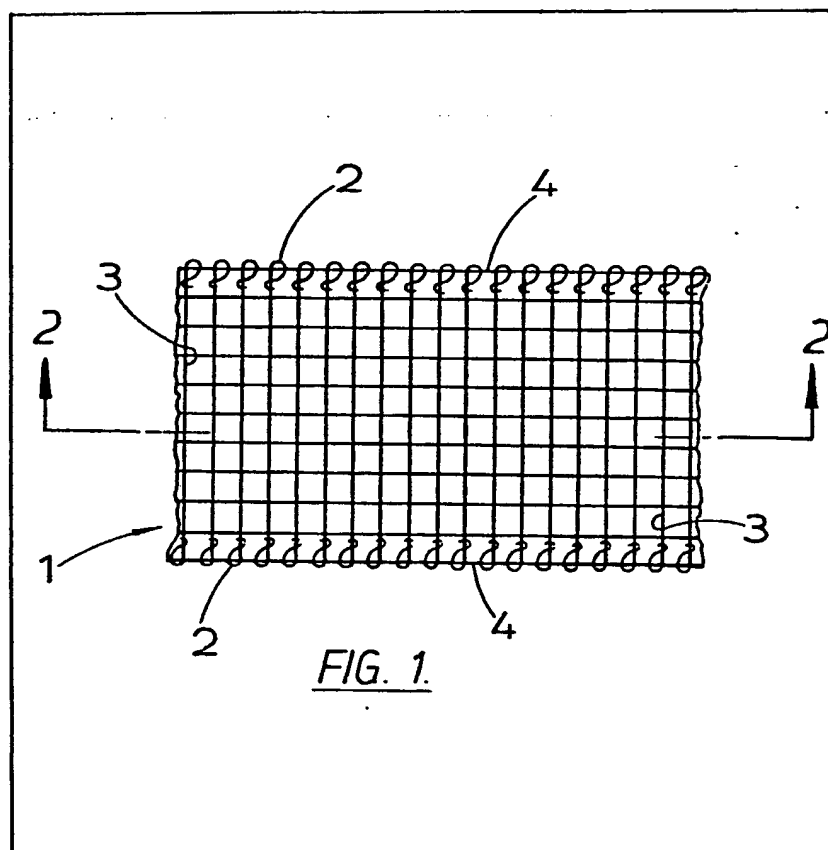
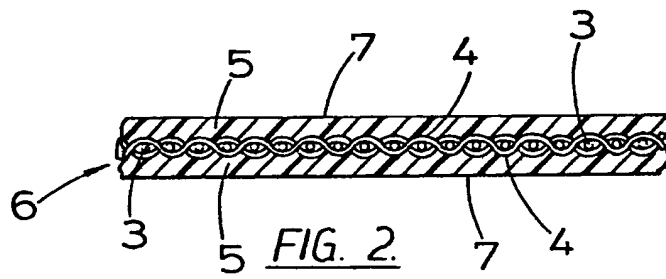
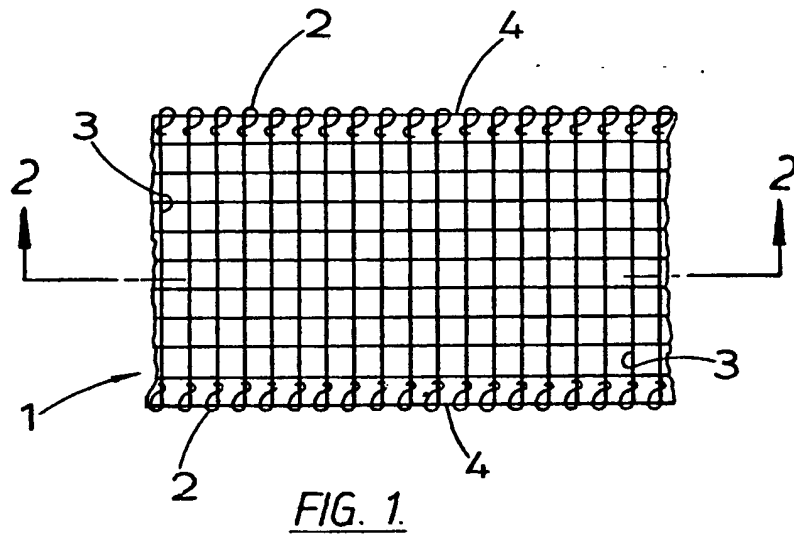


FIG. 1.

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SPECIFICATION

Conveyors

This invention relates to conveyor belts for use with belt conveyors in production-line manufacture or processing where certain successive operations are carried out at a number of stations spaced down the line.

In some production-line manufacture or processing precision of an indexing movement of the conveyor belt from one station to the next is critical otherwise the article being manufactured or processed can be damaged or even completely missed from certain operations.

This invention is particularly concerned with conveyor belts for use with belt indexing conveyors which are used in the food industry for the production of pies, tarts or analogous products including a pastry or paste casing.

Our British Patent No. 1 364 937 describes a conveyor having a continuous flexible belt formed with locations for receiving baking containers at regularly spaced apart positions along the length of the belt. The belt is arranged as an elongated loop having an upper operative run and a lower return run. Various pieces of apparatus for effecting the processing operations are situated along the upper run of the belt, and the arrangement is such that the belt is advanced to successively index located baking containers at each station where a processing operation is to be effected. For instance, the apparatus may include a paste depositor for extruding a quantity of paste into a foil baking container; a blocking head for forming the paste into the required shape relative to the container to provide a base casing; a hopper for filling the base casing with either meat or fruit or like filling; and a lidding head which crimps a paste lid to the base casing and severs the waste paste. Usually the paste lids are applied by hand at a manual station intermediate the hopper and the lidding head.

It will be understood, that it is most important that for each successive indexing step, the baking container is accurately aligned with the particular piece of apparatus at the respective stations along the production line.

It has been found that in using various forms and types of flexible belting there is a tendency for the belting to stretch or even distort so that the centres of holes for locating the drive pins and receiving the baking containers are not maintained sufficiently accurately to achieve correct indexing. This has led to severe disadvantages in operating the production line.

It was found that this stretching was caused mainly by the conventional arrangement for driving and supporting the belting. This arrangement includes chains extending on opposed sides of the belt, the chains being connected together at spaced intervals by lateral flight bars. The chains are driven through sprockets rotated as appropriate to the required indexing movement.

The belting is supported and connected to the

flight bars which extend transversely underneath the belting so as not to interfere with the locations for the baking containers. In use, as one or both chains because worn or stretched, the spacing between and/or alignment of the flight bars was affected and thus a stretching or distorting action was applied to the belt.

The improvement introduced into the art by our British Patent 1 364 937 provided non-extensible strips extending longitudinally of the belting and interconnecting all the flight bars and this modification alleviated the effect on the belt itself despite any variation or change in the lengths of the chain intermediate two adjacent flight bars.

Despite a considerable improvement in the situation resulting from the introduction of the above-described modification it was found that the standard conveyor belts made of pure synthetic materials, such as extruded polypropylene as well as those made from natural materials such as hessian or cotton weaves laminated with plastics, were still affected by certain extraneous conditions such as contact with water during use on the conveyor, or during cleansing in a tank after removal from the conveyor, or even atmospheric changes. These conditions could cause shrinking or stretching, depending on the material of the belt, over its entire length. Also, the practice of cleansing the belts with a steam hose could cause localised stretching or shrinkage. In some cases there could be a variation in length of up to 5 inches in a 42 foot length of belting making a replacement belt necessary. As in use the conveyor belts are changed fairly frequently with changes in the products being made and consequently require cleansing after removal the cost of frequent replacement belts as well as the disruption in production due to this problem has driven us to find a solution.

All the standard belts available were either quite unsuitable for the application or were similarly affected by the above-mentioned conditions and experiments with every type of known belt over a period of 14 years showed that none was capable of giving the precision or wear life that was considered desirable.

The possibility of adjusting the position of the various pieces of apparatus mounted along the conveyor instead of providing a new belt is not a practical proposition.

It is an object of the present invention to provide a conveyor belt for use with belt conveyors which is dimensionally stable in use.

From a first aspect the present invention consists in a conveyor belt for use with belt conveyors, the belt comprising a planar mesh matrix of metal securely bonded to a suitable plastics material to fill the mesh of the matrix and provide smooth impervious surfaces on both sides thereof.

Preferably, the matrix is a stainless steel mesh weave.

The matrix is preferably formed from 12 mesh 24 gauge stainless steel wire provided with a

selveldge but a range of mesh and gauge sizes could be used according to the particular application.

Preferably, the plastics material is a

5 polyurethane but a polypropylene or a polyvinyl chloride plastics material may be found suitable.

The belt may be formed as a sandwich with a coating of plastics material on each side of the matrix or the matrix may be embedded in a solid

10 mass of plastics material.

From another aspect the invention comprises a belt conveyor of the kind hereinbefore described in which the conveyor belt comprises a planar mesh matrix of metal securely bonded to a suitable

15 plastics material to fill the mesh of the matrix and provide smooth impervious surfaces on both sides thereof. Preferably, the matrix is a stainless steel mesh weave.

The gauge of the wires in the mesh and the size

20 of the mesh will depend on the stiffness of belt required and the choice of plastics material used for the coating. Generally, the gauge of the wire must not be so large that the belt can only be used with large diameter pulleys and the size of the

25 mesh must not be such that the spacing of the wires causes difficulty in bonding the plastics material. On the other hand the gauge of the wire must not be so small that the finished belt is too flexible for its application. A fine judgement will be

30 required when producing a specification for the manufacture of a belt for a particular conveyor.

A preferred embodiment of the invention will now be described by way of example only with reference to the accompanying diagrammatic

35 drawings wherein:—

Figure 1 is a plan-view of stainless steel mesh weave forming a matrix for a conveyor belt according to this invention, and

40 Figure 2 is a section on the line 2—2 of Figure 1.

In the manufacture of a conveyor belt according to this invention for use, for example, with a belt conveyor of the kind described in our British Patent No. 1 364 937, a 100 ft length of planar

45 stainless steel woven wire mesh 1 is made up. It is provided with a selvedge 2 on each side by weaving the free ends of the weft wires 3 back over warp wires 4 of the mesh, so providing a smooth safe edge. The overall width of the matrix

50 is approximately 15 inches.

The chosen gauge of wire for this application is 24 and the chosen mesh No. is 12.

The length of wire matrix is then coated with polyurethane 5 by placing sheets of this material

55 to cover completely both sides of the matrix 1 and then clamping the length in a press (not shown) between platens which are then heated to a predetermined temperature for a predetermined time. The time period will be just sufficient to

60 cause the polyurethane to flow inwardly over the wires from both sides of the matrix sufficiently to fill the mesh and embrace all the wires 3, 4. The platens are then removed and the polyurethane is allowed to cure by cooling so that the wires of the

65 matrix are locked together by the plastics material to form a strong integrated belt structure 6. The cured belt length 6 has a smooth finish on both sides 7 and is impervious to liquids. It has a thickness of approximately 0.08 inches which is a

70 fairly critical dimension as the finished thickness must be matched with the dimensions of the support cup which is extended upwardly to enclose the body of the container during the blocking operation.

75 After curing the belt length 6 is accurately punched on given centres to provide pairs of opposed holes for the chain drive pins and container locating holes accurately pitched between said pairs of holes. This location of the

80 container holes not only allows the support cup to extend between the flight bars it also helps to minimise the effect of chain wear on the belt. The finished belt length 6 is then joined in any known manner to form a conveyor belt suitable for use

85 over conveyor drive pulleys having an 18 inch radius.

Use of a conveyor belt as hereinbefore described in combination with a conveyor as described in our British Patent 1 364 937 largely

90 eliminates the problems described herein and provides a belt which is strong, hygienic in use on food conveyors and dimensionally stable.

CLAIMS

1. A conveyor belt for use with belt conveyors,

95 the belt comprising a planar mesh matrix of metal securely bonded to a suitable plastics material to fill the mesh of the matrix and provide a substantially smooth impervious surface on at least one side thereof.

100 2. A conveyor belt as claimed in claim 1, wherein the belt is formed as a sandwich with a coating of plastics material on each side of the matrix.

3. A conveyor belt is claimed in claim 1, wherein the matrix is embedded in a solid mass of plastics material.

4. A conveyor belt as claimed in any preceding claim, wherein the matrix is woven from wire.

5. A conveyor belt as claimed in claim 4, wherein the matrix is provided with a selvedge on each side thereof.

6. A conveyor belt as claimed in claim 5, wherein the selvedge is formed by weaving the free ends of the weft wires back over the warp

115 wires to provide a substantially smooth edge.

7. A conveyor belt as claimed in any of claims 4 to 6 wherein, the matrix is formed from substantially 24 gauge steel wire woven to provide a substantially 12 mesh spacing.

8. A conveyor belt as claimed in claim 7, wherein the wire is of stainless steel.

9. A conveyor belt as claimed in any preceding claim, wherein the plastics material is polyurethane, polypropylene, or polyvinyl

125 chloride.

10. A conveyor belt for use with belt conveyors,

substantially as hereinbefore described with
reference to Figures 1 and 2 of the accompanying
drawings.

11. A belt conveyor of the kind hereinbefore
5 described comprising a conveyor belt as claimed
in any one of claims 1 to 10.

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